

# Marco Esposito

## WORK EXPERIENCE

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### Postdoctoral Researcher

*Verimag / Université Grenoble-Alpes* [ 1 Apr 2023 – Current ]

City: Grenoble

Country: France

I am part of a research group which focuses on Formal Verification of Cyber-Physical Systems.

### Research Associate

*Sapienza University of Rome* [ 1 Apr 2022 – 31 Mar 2023 ]

Country: Italy

I have led the research project "*Model-based Automatic Synthesis of Personalized Therapies via Black-Box Optimization*".

### Teaching Assistant

*Sapienza University of Rome* [ Jun 2019 – Current ]

As a TA for the Artificial Intelligence and Database Systems classes, I tutor students, plan and evaluate final exams, manage and update teaching material, and give supplementary seminars.

### Teaching Assistant

*LUISS Guido Carli* [ 19 Sep 2022 – 3 Dec 2022 ]

City: Rome

Country: Italy

TA for the "Databases and Big Data" course of the Bachelor's degree in Management and Computer Science.

### Software Development Intern

*IBM* [ Sep 2015 – Apr 2016 ]

Country: Italy

As a member of the IBM Control Desk development team, I focused on software prototyping and development activities. In particular, I integrated Control Desk with Cloud, Cognitive and Big Data technologies, such as IBM Watson.

## EDUCATION AND TRAINING

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### Doctor of Philosophy in Computer Science

*Sapienza University of Rome* [ 1 Nov 2018 – 14 Sep 2022 ]

Thesis: Simulation-based Design Optimization of Critical Systems via Statistical Model Checking

As a member of the Model Checking Lab group within the Computer Science department, I focused my research on Artificial Intelligence, Optimization, and Formal Methods techniques for personalized (in silico) medicine and the design and analysis of critical systems.

My areas of expertise are:

- Simulation-based (derivative-free) optimization
- Statistical Model Checking
- Cyber-Physical Systems verification
- In Silico Clinical Trials

I developed a Python framework, *apricopt*, for black-box optimization of cyber-physical and biological systems, which is available (as free software) on *PyPi*.

I co-supervised one PhD Student and several Bachelor's and Master's students' theses.

I contributed to several project proposals and was responsible for writing part of the deliverables for the SCAPR (POR FESR) project.

### **Master's degree in Computer Science**

**Sapienza University of Rome** [ 14 Dec 2016 – 22 Oct 2018 ]

Final grade: 110/110 with honors

Thesis: Unbounded System-level Formal Verification of Cyber-Physical Systems

### **Bachelor's degree in Computer Science**

**Sapienza University of Rome** [ 30 Sep 2012 – 13 Dec 2016 ]

### **Erasmus+ mobility**

**Technische Universität Wien** [ Sep 2017 – Feb 2018 ]

Address: Vienna (Austria)

Field(s) of study: Logic and Computation

## **PUBLICATIONS**

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### **Formal Certification of Surrogate Models for Cyber-Physical Systems Verification**

[2022]

Workshop on Artificial Intelligence and fOrmal VERification, Logic, Automata, and sYnthesis OVERLAY

Link: <https://overlay.uniud.it/workshop/2022/papers/paper11.pdf>

### **Estimation Based Verification of Cyber-Physical Systems via Statistical Model Checking**

29th RCRA International Workshop on Experimental Evaluation of Algorithms for Solving Problems with Combinatorial Explosion, 2022. Accepted

### **A Comparative Study of AI Search Methods for Personalised Cancer Therapy Synthesis in COPASI**

Lecture Notes in Artificial Intelligence, volume 13196 · Jul 19, 2022

### **Simulation-based synthesis of personalised therapies for colorectal cancer**

3rd Workshop on Artificial Intelligence and Formal Verification, Logic, Automata, and Synthesis, 2021

### **AI-guided optimal deployments of drone-intercepting systems in large critical areas**

3rd Workshop on Artificial Intelligence and Formal Verification, Logic, Automata, and Synthesis, 2021

### **Intelligent search for personalized cancer therapy synthesis: an experimental comparison**

28th RCRA International Workshop on Experimental Evaluation of Algorithms for Solving Problems with Combinatorial Explosion, 2021.

### **Selection of information sources based on social activities**

Patent published by the *US patent office*, 2018.

## **PROJECTS**

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### **Research Grant "Avvio alla Ricerca" | 2022**

"Model-based Automatic Synthesis of Personalized Combination Therapies for Colorectal Cancer" | Sapienza | 1300€

## Research Grant "Avvio alla Ricerca" | 2019

"Optimization of Antidrone Sensors Deployment in Critical Areas via an Explicit Geometric Approach based on Artificial Intelligence" | Sapienza | 1000€

## COURSES

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Summer School in Formal Techniques (SSFT22) | SRI International | Atherton, CA, USA | 2022

2nd VMCAI (Verification, Model Checking and Abstract Interpretation) Winter School | New Orleans, LA, USA | 2020

1st VMCAI (Verification, Model Checking and Abstract Interpretation) Winter School 2019 | Lisbon, Portugal | 2019

3rd Summer School on Formal Methods for Cyber-Physical Systems | Verona, Italy | 2019

Debug and Optimization of Scientific Applications | CINECA | Casalecchio di Reno (BO), Italy | 2018

## OTHER ACTIVITIES

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### Program Committee Member for OVERLAY 2022

[ 28 Nov 2022 ]

4th Workshop on Artificial Intelligence and fOrmal VERification, Logic, Automata, and sYnthesis (OVERLAY 2022)

Link: <https://overlay.uniud.it/workshop/2022/>

### Reviewer and Subreviewer

Conferences and workshops

- RCRA RCRA 2019, 2021, 2022
- IJCAI 2021
- OVERLAY 2022
- ICTAI 2020, 2022

Journals

- Bioinformatics
- MPDI Modeling

## LANGUAGE SKILLS

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Mother tongue(s): **Italian**

Other language(s):

### English

LISTENING C2 READING C2 WRITING C2

SPOKEN PRODUCTION C2 SPOKEN INTERACTION C2

### German

LISTENING A1 READING A1 WRITING A1

SPOKEN PRODUCTION A1 SPOKEN INTERACTION A1

## DIGITAL SKILLS

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### Software

Model-Based Design / Programming / Big data / R / SQL / MATLAB / Python / Simulink/Stateflow / Java / UML / Modelica

### Tools

Git / LaTeX / High Performance Computing / SLURM / Docker / UNIX / Linux

## **AI & Systems Engineering**

Artificial Intelligence / Machine Learning / Verification and Validation / Simulation-based Optimization / Software Engineering / Modeling and Simulation / Cyber-Physical Systems / Algorithms / Formal Methods / Model Checking / ODE Simulation / Monte Carlo Simulation / Black-box Optimization

## **Computational Biology**

Systems Biology / Bioinformatics / Personalized Medicine / In silico clinical trials / SBML / Quantitative Systems Pharmacology

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